Solution by M. E. GRABER, Graduate Student, Heidelberg University. Tiffin, Ohio, and the PROPOSER.

Let λ=wave length, d=distance apart of grating, θ=angular distance, n=order from central one. Then $\lambda=d\sin\theta/n$.

$$\frac{.05\sin 41'}{1}=.000596305\text{mm.},\quad \frac{.05\sin 1°21'}{2}=.000588995\text{mm.},$$

$$\frac{.05\sin 2°2'}{3}=.000591348\text{mm.},\quad \frac{.05\sin 2°42'}{4}=.000588831\text{mm.},$$

$$\frac{.05\sin 3°21'}{5}=.000590160\text{mm.},\quad \frac{.05\sin 4°3'}{6}=.000588558\text{mm.}$$

λ=the mean of these six. $\therefore\ \lambda=.0005906995$mm.

DIOPHANTINE ANALYSIS.

99. Proposed by the late HON. JOSIAH H. DRUMMOND, LL. D.

If p and q are such values of x and y as fulfill the conditions $x^2\pm y^2-1$=a square, find, in terms of p and q, the expression for an indefinite number of other values.

Solution by G. B. M. ZERR. A.M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

$x^2\pm y^2=a^2+1=b$, or $\dfrac{x^2}{b}\pm\dfrac{y^2}{b}=1$.

Let $x=p$, and $y=q$ be a solution. Then $(p^2/b\pm q^2/b)^n=1$.

$\therefore\ [x/\sqrt{b}+y\sqrt{(\pm1)}/b][x/\sqrt{b}-y\sqrt{(\pm1)}/\sqrt{b}]=[p/\sqrt{b}+q\sqrt{(\pm1)}/\sqrt{b}]^n$ $\times[p/\sqrt{b}-q\sqrt{(\pm1)}/\sqrt{b}]^n$.

Put $x/\sqrt{b}+y\sqrt{(\pm1)}/\sqrt{b}=[p/\sqrt{b}+q\sqrt{(\pm1)}/\sqrt{b}]^n$.

$x/\sqrt{b}-y\sqrt{(\pm1)}/\sqrt{b}=[p/\sqrt{b}-q\sqrt{(\pm1)}/\sqrt{b}]^n$.

$$\therefore\ x=\frac{\sqrt{b}}{2}\{[p/\sqrt{b}+q\sqrt{(\pm1)}/\sqrt{b}]^n+[p/\sqrt{b}-q\sqrt{(\pm1)}/\sqrt{b}]^n\},$$

$$y=\frac{\sqrt{b}}{2\sqrt{\pm1}}\{[p/\sqrt{b}+q\sqrt{(\pm1)}/\sqrt{b}]^n-[p/\sqrt{b}-q\sqrt{(\pm1)}/\sqrt{b}]^n\}.$$

By ascribing to n the values 1, 2, 3, ..., as many solutions as are desired can be obtained.

100. Proposed by A. H. BELL, Hillsboro, Ill.

Prove that every indeterminate equation of the second degree can be reduced to $x^2-Ay^2=Bz^2$. [*Legendre.*]

Solution by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University. Cal.

Let $ax'^2+2hx'y'+by'^2+2gx'+2fy'+c=0$ represent any determinate equa-